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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/561,825

**Applicant(s)**

RAKHMAN ET AL.

**Examiner**

Jeffrey Lenihan

**Art Unit**

4171

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/DE)  
Paper No(s)/Mail Date 12/22/2005, 05/03/2006
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 22 is objected to because of the following informalities: step (d) of the claimed process recites that the temperature is raised to the melting point of the matrix, then states "... and the cross-linking agent and antioxidant." No action is associated with these compounds in the claim. Based on the context of the passage, the examiner interprets that one of ordinary skill in the art would expect that the recited step was intended to disclose the addition of the cross-linking agent and antioxidant to the mixture. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 3 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification of the instant application states that the crosslinking agent to be used in the reactive vulcanization process may be organic sulfonic or carboxylic acids (§0027, lines 7-10). The instant claim 3, however, recites the limitation that the crosslinking agent may be an organic acid. The examiner notes

that functional groups other than sulfonic and carboxylic acids, such as thiol and phenol, confer weak acidity to organic compounds. There is therefore insufficient support in the specification for the use of the generic term "organic acid" in the instant claims.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 27 and 35 recite the limitation "the semi-crystalline polymers" in claims 24 and 25, respectively. There is insufficient antecedent basis for this limitation in the claims. Both claim 24 and claim 25 of the instant application disclose thermoplastic vulcanizates (TPVs) comprising a matrix component and a disperse phase component, as well as specific properties by which said vulcanizates are characterized; however, neither claim recites the limitation of "semi-crystalline polymers." The instant claims 26 and 34 depend from claims 24 and 25, respectively, with each reciting that the matrix component of the respective antecedent claim may be either a semi-crystalline polymer or an amorphous polymer. The examiner notes for the record that the instant claims 27 and 35 have been treated as depending from claims 24 and 25, respectively, for the purposes of examination and suggests that the claims should be amended to correct the issue of dependency.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-3, 11-13, 15-17, 19, 24, 25, 28-30, and 36-38 are rejected under 35

U.S.C. 102(b) as being anticipated by Bernhard Rustige GmbH & Co KG, DE4402943, published 08/03/1995. The examiner notes that these rejections are based on the English translation of said document provided to the Office by the Applicant.

8. Regarding claims 1 and 3, the applicant discloses a process for producing TPVs comprising preparing a mixture of polymeric materials including a matrix and a disperse phase component, and carrying out dynamic vulcanization of the disperse component. The vulcanization process comprises the grafting of an organic silane onto the disperse phase component and crosslinking the disperse phase component chains in the presence of a crosslinking agent comprising an acid. The grafting and crosslinking is performed in the molten state of the disperse phase. Claim 3 recites that the crosslinking agent is chosen from a group comprising, among others, organic acids.

9. DE4402943 discloses a polymeric working material which is a two-phase thermoplastic material containing a polypropylene matrix component in which a polyethylene component is microdispersed (Page 3, lines 7-17). The polyethylene component is grafted via the addition of radical donors, such as organic peroxides, and organic silanes (Page 4, lines 26-31), followed by reaction of the silane groups with a crosslinking agent to produce crosslinked polyethylene chains. A number of crosslinking agents are recited as suitable for use in the disclosed process, including catalytic agents, such as organic acids and amines, which "shift the pH value of the

Art Unit: 4171

wetting solution into the acid or alkali region" (Page 4, line 46 and Page 7, lines 25-27).

Both grafting and crosslinking of the silane groups are performed with mixing while the polyethylene is in the molten state.

10. Regarding claim 2, the applicant recites that the organic silane of claim 1 is an alkoxy silane. DE4402943 recites the use of vinyltrimethoxysilane (VTMOS) and vinyltriethoxysilane (VTEOS), both alkoxy silane compounds as required in the instant claim, for grafting silane groups onto the disperse phase polymer (Page 4, lines 26-28).

11. Regarding claims 11, 13, 28, 30, 36, and 38; DE4402943 discloses that the proportion of matrix component in a preferred blend of the composition is 20-65% by weight based on the total weight of the final polymer composition. The polyolefin disperse phase, correspondingly, is present in a proportion of 35-80% by weight (Page 4, lines 4-8). These ranges overlaps with the ranges of 15-80% and 20-85% disclosed for the matrix and disperse phase components, respectively, in the instant claims.

12. The instant claims 12, 29, and 37 depend from claims 1, 24, and 25, respectively, and recite the limitation that the cross-linked disperse phase is chosen from the group comprising polyethylene having a density in the range  $0.90\text{-}0.96\text{ g/cm}^3$ , etc. DE4402943 discloses that the disperse phase may be a very low density polyethylene (VDPE) having a density of  $0.88\text{ to }0.99\text{ g/cm}^3$  (DE4402943, claim 1). This range coincides with the density range of  $0.90\text{-}0.96\text{ g/cm}^3$  for polyethylene in the disperse phase as recited in the instant claims.

13. Regarding claim 15, the applicant recites the addition of a step to the process of claim 1 comprising the addition of plasticizers, mineral fillers, functional components,

etc. to the TPV. DE4402943 discloses that additives such as plasticizers, fillers, and other functional components such as flame retardants, stabilizers, and metal-ion deactivators may also be added to the two-phase polymer material (Page 4, lines 14-18).

14. Regarding claim 16, the applicant recites the process of the instant claim 1 in which the matrix is not cross-linkable. As recited in DE4402943, the temperature at which silane grafting is performed on the disperse phase are such that the polypropylene matrix component is not in the molten state and, as a result, is not modified with silane groups. As such, the matrix component of the polymeric working material of DE4402943 is not cross-linkable during the cross-linking reaction.

15. Regarding claim 17, DE4402943 discloses a process for grafting of silane onto the polyethylene component in a two phase polymeric material. Polyethylene is first mixed with a grafting solution comprising peroxide and organic silane, after which it is mixed with polypropylene powder in a mixer. The temperature is raised such that the polyethylene, having a melting point between 60° and 100° C, melts, and the grafting reaction takes place. The polypropylene at this stage is still in a granulate form. After the grafting reaction of silane onto the polyethylene melt has occurred, the temperature is further raised so that the polypropylene component melts as well, thereby allowing for mixing of the polypropylene with the silane-grafted polyethylene to take place (Page 6, line 47 to Page 7, line 2; Page 8, line 24 to Page 9, line 12). This process corresponds to that of the instant claim, in which the disperse phase component has a melting point

lower than that of the matrix component, and grafting of the silane to the disperse phase component occurs at a temperature between the two melting points.

16. Regarding claim 19, the applicant recites the removal of any residues of volatile components by venting after the grafting stage has ended. DE4402943 discloses the degassing of the polymer composition to remove volatile reaction products from the working material (Page 5, line 10-13).

17. Regarding claims 24 and 25, the applicant claims TPVs characterized by specific properties such as low or low to medium rigidity, high flexibility, etc. DE4402943 does not explicitly disclose all of the properties recited in the instant claims. As discussed in previous paragraphs of this Office Action, the two phase polymer working material described in DE4402943 is prepared from matrix and disperse phase components corresponding to those used in the instant application. DE4402943 also discloses that acid compounds may be used to catalyze the cross-linking reaction as recited in the instant application, and further recites that the percent gel content of the disperse phase component may be between 60 and 95% (Page 7, lines 41-42), a range overlapping the "more than 95%" range disclosed in the instant application (§10037). As the materials disclosed in the instant application and DE4402943 comprise the same materials and are treated in the same manner to produce the similar levels of cross-linking in the disperse phase component, the examiner takes the position that the properties recited in the instant claims would be inherently present in the materials disclosed by DE4402943, rendering the material of the instant claims anticipated by the prior art.



***Claim Rejections - 35 USC § 103***

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

20. Claims 6-10, 20, 21, 26, 27, 33-35, 40, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bernhard Rustige GmbH & Co KG, DE4402943.

21. Claims 6, 7, 20-21 recite further limitations on the process by which the TPVs are produced. Claims 6, 20, and 21 recite that the dynamic vulcanization reaction is carried out in batch mode (claim 6), wherein the grafting and cross-linking reactions are performed successively (claim 20) or in different zones of the barrel of an extruder (claim 21). Regarding claims 7, the applicant recites that the dynamic vulcanization reaction of the instant claim 1 is performed in continuous mode.

22. DE4402943 discloses a process in which dynamic vulcanization is performed in an extruder (Page 8, line 24 to Page 9, line 16; Figure 2). A mixture comprising polypropylene and polyethylene premixed with a grafting solution are added to the

hopper of an extruder. The mixture is heated first to a temperature sufficient to melt the polyethylene component only, allowing the grafting reaction to take place. After completion of the grafting of silane onto the polyethylene, cross-linking is performed in a different zone of the extruder barrel. DE4402943 also discloses the venting of the mixture to remove volatile components during the process (page 7, last paragraph). DE4402943 does not specifically recite that the vulcanization process is performed in continuous mode or in batch mode; however, the examiner notes that batch mode and continuous mode differ only in that a continuous mode extrusion process involves a continuous addition of starting materials to the apparatus so that product will be discharged interruption while the machine is in operation, thereby increasing production; batch mode entails the processing of a single batch of reagents. As it is known in the art that extruders can be used to process polymers in both batch and continuous modes, the examiner takes the position that the it would have been obvious to one of ordinary skill in the art of polymer extrusion that the process disclosed by DE4402943 could be performed in either mode to suit the needed production levels.

23. Regarding claims 8, 9, 10, 26, 27, 34, and 35; the instant claims depend from claims 1 (claims 8 and 9), 8, 24 (claims 26 and 27), and 25 (claims 34 and 35), respectively, and recite further limitations regarding the matrix materials of the TPVs of the parent claims. Claim 8 recites that matrix is a semi-crystalline polymer, and claim 10 further defines the matrix as being chosen from the group comprising propylene homopolymers, co-polymers, etc. Claim 9 recites the limitation that the matrix is an amorphous polymer. Claims 26 and 34 recite that the matrix may be semi-crystalline or

amorphous, and claims 27 and 35 recite the same possible semi-crystalline polymers as claim 10.

24. DE4402943 discloses that the matrix component is preferably chosen from the group consisting of polypropylene homopolymers, polypropylene block copolymers, and polypropylene random copolymers (Page 4, lines 10-12). The examiner notes that it is well known in the art that such polymers may be either semi-crystalline or amorphous, depending on both the processing performed on the polymer as well as the catalyst used during the polymerization reaction. The examiner takes the position that it would have been obvious to one of ordinary skill in the art to use a semi-crystalline or amorphous propylene polymer as the matrix material described in DE4402943, as a lower degree of crystallinity would facilitate the distribution of the cross-linked disperse phase particles throughout the matrix material.

25. Claims 33, 40, and 41 recite TPVs comprising a matrix component and a silane cross-linked disperse phase component, wherein the disperse phase component comprises more than 95% gel content.

26. DE4402943 discloses a thermoplastic two phase polymer working material comprising a matrix component and a cross-linked disperse phase component, wherein the disperse phase component comprises 60 to 95% gel content (Page 7, lines 41-42). It has been held that a range of "more than 5%" would overlap a disclosure of 1-5%, *In re Wertheim*, 541 F. d. 257, 191 USPQ (CCPA 1976), *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d. 1934 (Fed. Cir. 1990). The examiner takes the position that the claimed range and prior art range for gel content in the disperse phase are close enough that

one of ordinary skill in the art would expect the two materials to display the same properties.

27. Claims 4, 14, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bernhard Rustige GmbH & Co KG, DE4402943 in view of Tsumura, US5623030.

28. Claim 4 depends from claim 3, and recites the additional limitation that cross-linking agent is either a) boric acid, or b) adipic acid with an amine. As discussed previously in this Office Action, DE4402943 discloses that acid compounds may be utilized as catalysts to expedite the cross-linking of the silane-grafted disperse phase component. DE4402943 does not specifically disclose the use of either acid named in the instant claim.

29. Claim 14 depends from claim 1, and states that the cross-linking agent is in the amount of 0.05 to 5 parts per 100 parts of the total polymeric composition. DE 4402943 does not recite the use of acid catalysts at this concentration.

30. Tsumura discloses the use of a catalyst comprising boric acid as suitable for condensation reactions of trialkoxysilane groups (Column 9, line 6). Tsumura further recites that the catalysts used to promote condensation reactions in US5623030 are used at a level of 0.01 to 20 parts by weight, more preferably 0.5 to 6 parts by weight, of the polymer (column 12, line 66 to Column 13, line 2). As it was known in the art that boric acid may be used as a catalyst for silane cross-linking reactions at concentrations similar to those recited in the instant application, the examiner takes the position that it would have been obvious to one of ordinary skill in the art to use boric acid, as taught

by US5623030, at the concentrations claimed as the acid catalyst disclosed in DE4402943 to affect a silane cross-linking reaction.

31. Claim 32 depends from claim 1, and recites the additional limitation that the grafting and cross-linking reactions do not require the addition of water into the polymeric materials. As noted above, Tsumura discloses the use of a catalyst comprising boric acid as a catalyst for the hydrolysis and condensation of substituted silanes in silsequioxane ladder polymers. Tsumura further discloses that the addition of water to the polymers is optional (Column 8, lines 51-55 and Column 13, lines 29-36). The examiner therefore takes the position that Tsumura inherently teaches that water is not required to perform cross-linking of silane groups when a catalyst comprising an acid is utilized to affect the hydrolysis and condensation of such groups. As both DE4402943 and Tsumura disclose the use of acids as a catalyst for cross-linking polymers containing alkoxy silane groups, it would have been obvious to one of ordinary skill in the art to modify the teachings of DE4402943 with those of Tsumura to simplify the process in DE4402943 by reducing the number of reagents which must be added.

32. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bernhard Rustige GmbH & Co KG, DE4402943 in view of Joffe et al, US5840800. The instant claim depends from claim 4, and recites the limitation that the cross-linking agent is a combination of adipic acid and either triethanolamine or triisopropanolamine. DE4402943 does not disclose the use of the recited compounds as a cross-linking catalyst.

33. Joffre teaches the use of carboxylic acid compounds, bases, etc. as catalysts for cross-linking of silicon modified polymers (Column 15, lines 36-37), and further discloses that catalysts may comprise combinations thereof (Column 15, line 41-42). As Joffre generically discloses the use of combinations of amines, including triethanolamine (column 15, line 57), with carboxylic acids without criticality as a suitable catalyst for cross-linking of silanol groups, the examiner takes the position that the use of adipic acid with the disclosed amines as the cross-linking agent described in DE4402943 would have been obvious to one of ordinary skill in the art.

34. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bernhard Rustige GmbH & Co KG, DE4402943 in view of Deguchi et al, US4558094.

35. Claim 18 depends from claim 1, and recites the additional limitation that the grafting is carried out at temperatures at which all the polymeric components are molten. DE4402943 recites that the grafting is performed at a temperature below the melting point of the matrix material. The examiner notes that DE4402943 recites that the process described, i.e., grafting when the matrix material is not in the molten state followed by dynamic wetting of the disperse phase during which all components are molten, results in a stabilization of the dispersed polyethylene phase as it is distributed throughout the polypropylene matrix, resulting in a stable uniform blend of polyethylene and polypropylene (page 6, lines 13-15).

36. Deguchi discloses a cross-linked product of a silane-grafted propylene resin, an ethylene resin, and an ethylene/ $\alpha$ -olefin rubber (abstract). Deguchi further discloses

that compositions may be produced comprising silane-grafted polypropylene may be blended with the ethylene resin and ethylene/ $\alpha$ -olefin which are both modified with silane functional groups as well (see Example 1, Table 1, claim 13) followed by cross-linking with a silanol cross-linking agent, and the resulting improvements in properties such as heat resistance and impact strength.

37. It is well known in the art that polyethylene and polypropylene are incompatible polymers, and that melt-blending of the two results in the dispersion of polyethylene particles within the polypropylene matrix. In such a case, the impact resistance of polypropylene is improved. As discussed above, DE4402943 discloses a motivation for the stabilization of the polyethylene disperse phase within the polypropylene matrix. As it was known in the art to cross-link blends of silane-grafted polypropylene and silane-grafted polyethylene polymers, resulting in improved properties for the final product, the examiner takes the position that it would have been obvious to one of ordinary skill in the art to perform the silane-grafting reaction disclosed in DE4402943 at a temperature at which all components of the mixture would be molten. Doing so would allow for grafting of the alkoxysilane functional groups on the polypropylene as well as the polyethylene component, allowing for a degree of cross-linking between the two which would further stabilize the dispersion of the polyethylene particles within the polypropylene matrix and improving the properties of the polymeric working material.

38. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bernhard Rustige GmbH & Co KG, DE4402943 in view of Topcik, US4873042.

The instant claims recite processes by which the TPVs of the instant application are prepared in batch mode (claim 22) and continuous mode (claim 23). Claim 22 recites the steps of a) mixing the disperse phase component and at least part of the matrix with the chosen silane, free radicals, free radical generators, and optionally tin-organic compounds, b) bringing the mixture to the grafting temperature, c) allowing the grafting to take place, d) raising the temperature to at least the melting point of the matrix and **adding** (interpreted by examiner, see paragraph 1 of this Action) the cross-linking agent and antioxidant, e) allowing cross-linking to occur, f) optionally devolatilizing the product, g) adding any required additional components, and h) discharging the product.

39. Claim 23 depends from claim 7 and further recites that the process should occur via the steps of a) feeding at least part of the matrix and all other polymeric components to the feed hopper of an extruder, b) feeding silane and peroxide to a feeding zone, while cooling said zone, c) heating the grafting zone of the extruder to such a temperature as to melt the disperse phase without melting the matrix, d) kneading the mixture, e) feeding an additional feeder zone of the extruder the additives to needed to cause cross-linking, f) adding the remainder of matrix, if necessary, g) mixing and kneading the mixture while heating, h) removing volatiles, i) optionally adding extender oil, and k) extruding the final product (claim 23).

40. As noted in paragraphs of this Office Action, DE4402943 discloses both batch mode and continuous mode production of two-phase working materials which are equivalent to the TPVs of the instant application. DE4402943 does not disclose the



addition of an antioxidant to the mixture to neutralize the peroxide utilized as a grafting catalyst, thereby stopping that reaction.

41. Topcik teaches a process for extruding a thermoplastic polymer, in which silane-grafted polyethylene is prepared and cross-linked. Topcik discloses that 1, 3-dihydro-2, 2, 4-trimethylquinoline, an antioxidant, is added to the grafting reaction to act as a radical trap, thereby regulating the degree to which the reaction takes place (Column 3, lines 5-34). Inherent in the disclosure of DE4402943 is the intention to minimize and/or prevent the occurrence of grafting of silane functional groups onto the polymeric chains of the matrix component. The grafting reaction is performed at a temperature at which the matrix component will not be in the molten state for the specific purpose of avoiding this reaction. The examiner therefore takes the position that it would have obvious to one of ordinary skill in the art at the time of the invention to add an antioxidant to the mixture disclosed by DE4402943 to serve as a radical trap, as taught by Topcik, as a means to further reduce the occurrence of undesired side reactions between silane compounds and the matrix component once the temperature was raised and the matrix became molten.

42. Claims 31 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bernhard Rustige GmbH & Co KG, DE4402943 in view of Coran et al, US4183876. Claims 31 and 39 depend from claims 24 and 25, respectively, and recite the limitation that the TPVs of the parent claims are formed into products via extrusion, injection

molding, thermiforming, blow molding, or calendaring. DE4402943 does not discuss the processing of TPVs via the recited processing techniques.

43. Coran discloses thermoplastic compositions similar to those recited in the instant application, comprising a blend of cross-linked rubber and crystalline thermoplastic polyolefin resin (Column 1, lines 59-64), corresponding to the disperse phase and matrix materials of the instant application. Said thermoplastic compositions may be produced via dynamic vulcanization (Column 3, lines 1-14). Coran defines a blend as a mixture comprising well dispersed small particles of cross-linked rubber (Column 3, lines 51-52). The reference further discloses that the cross-linked rubber should have a gel content of 50% or more, or 80% or more (Column 2, lines 52-58). Coran discloses that the thermoplastic compositions recited in US4183876 are useful for making tires, hoses, belts, etc. via such processes as extrusion and injection molding (Column 6, lines 27-31). As both DE4402943 and Coran teach the production of thermoplastic compositions comprising a cross-linked disperse phase and a matrix material, one of ordinary skill in the art would expect the materials to display similar properties and be useful for the manufacturing of the same items. The examiner therefore takes the position that it would have been obvious to process the compositions disclosed in DE4402943 via extrusion, etc. to manufacture the articles disclosed in Coran.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wenig et al, published in Progr. Colloid & Polymer Sci. in 1985,

Art Unit: 4171

discloses that it is known in the art that polyethylene forms disperse particles when melt-blended with polypropylene.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey Lenihan whose telephone number is (571)270-5452. The examiner can normally be reached on Mon-Thurs: 7:30-5:00, every other Friday 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/  
Supervisory Patent Examiner, Art Unit 4171

Jeffrey Lenihan  
Examiner  
Art Unit 4171

/JL/

